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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/511,986	02/24/2000	Vernon M. Williams	4208US (99-0316)	6129

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EXAMINER

NADAV, ORI

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 11/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/511,986

Applicant(s)

WILLIAMS, VERNON M.

Examiner

ori nadav

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 47,48,50-56,58-68,75,90 and 110-124 is/are pending in the application.
- 4a) Of the above claim(s) 80 and 86-90 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 47,48,50-56,58-68,75-79,81-85 and 110-124 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

In view of the appeal brief filed on 9/24/2004, PROSECUTION IS HEREBY REOPENED. A new rejection for claims 47-48, 50-56, 58-63 and 110-124 is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

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The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 64-66, 68, 75, 77-79 and 81-83 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsuki et al. (5,969,424). Regarding claim 64, Matsuki et al. teach in figure 2 and related text (column 6, line 51 to column 7, line 37) a semiconductor device assembly, comprising: a carrier 11, 12 (column 7, lines 28-30) including contacts and carrying circuitry in communication with the contacts; and at least one semiconductor die 1, 2 adjacent the carrier, the semiconductor die including bond pads 4 (see plurality of bond pads in figure 1); and conductive elements 7 (see plurality of conductive elements 7 in figure 1) extending between and electrically contacting contacts (or wires) 11 (column 7, line 30) of the carrier and corresponding bond pads 4 to electrically connect circuitry of the at least one semiconductor die with the circuitry of the carrier, each of the conductive elements 7 including a plurality of superimposed, contiguous, mutually adhered layers 13, 15, each of the layers comprising copper, a conductive material (column 8, lines 31-34).

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Although Matsuki et al. do not all electronic circuit element 2 a semiconductor die, electronic circuit element 2 is a semiconductor device, thus rendering it a semiconductor chip.

Note that conductive elements 7 electrically contact contacts 11 of the carrier to corresponding bond pads 4, because during bonding contacts 11 are connected to bumps 10 (column 9, lines 11-15).

Regarding claim 75, Matsuki et al. teach in figure 2 substantially the entire claimed structure, as applied to claim 64 above, wherein the part of layer 11 contacting bump 10 during bonding is the at least one contact pad 11, and thus the at least one conductive element is in contact with both first and second contact pads.

Regarding claim 65, although Matsuki et al. do not categorize film carrier as a carrier substrate, a film carrier is synonymous to a carrier substrate.

Regarding claim 66, Matsuki et al. teach in figure 2 a carrier comprises leads 11 (column 7, line 30).

Regarding claims 68 and 77, Matsuki et al. teach in figure 2 conductive material comprises a metal (column 8, lines 58-61).

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Regarding claims 78-79, Matsuki et al. teach in figure 2 at least one of the first and second semiconductor device components comprises a packaged semiconductor die 2.

Regarding claim 81, Matsuki et al. teach in figure 2 at least one of the first and second semiconductor device components comprises a carrier substrate 11, 12.

Regarding claim 82, Matsuki et al. teach in figure 2 a carrier substrate includes a support structure 12 and at least one conductive element 7 in communication with the at least one contact pad 11 thereof. Layer 12 is a support structure, because during bonding contacts 11 are connected to bumps 10, and the substrate supports chip 2.

Regarding claim 83, Matsuki et al. teach in figure 2 at least one of the at least one conductive element 7 and the support structure 12 comprises a plurality of superimposed, contiguous, mutually adhered layers 13, 15, 16 of material.

Claim Rejections - 35 USC § 102/103

The text of those sections of Title 35, U.S. Code not included in this section can be found in previous section.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 47, 50-54, 58-59, 62-63, 110, 112-116, 119-120 and 123-124 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sullivan (4,610,941) in view of Fudim (4,752,498).

Regarding claims 47, 52, 110, 114 and 115, Sullivan teaches in figures 1 and 2 and related text a conductive trace 15, 11 (on a printed wiring board) at least partially formed on at least one semiconductor device component 10, comprising a plurality of superimposed, contiguous, mutually adhered layers 11, each of the layers comprising conductive polymer, at least a portion of the conductive trace being configured to extend and conduct electrical signals along a plane which is parallel to a plane in which at least one semiconductor device component is located (column 5, lines 23-35 and column 6, lines 57-68).

Sullivan does not explicitly state that conductive polymer 11 comprises a plurality of superimposed, contiguous, mutually adhered layers.

A plurality of superimposed, contiguous, mutually adhered conductive polymer layers are indistinguishable from one another, and thus can be considered as one layer. Fudim teaches in figures 3A and 4B forming conductive polymer by solidifying liquid conductive polymer 11 (the thick lines in figure 4B) to form conductive polymer 25b. Fudim further teaches that this process can be repeated many times (column 4, lines 5-6). Solidifying liquid polymer material

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multiple times would result in one indistinguishable conductive polymer layer.

Therefore, there is no structural difference between a conductive polymer that is formed by solidifying the liquid polymer one time and a conductive polymer that is formed by solidifying the liquid polymer plurality of times.

Sullivan also teaches forming conductive polymer 11 by solidifying liquid conductive polymer. Therefore, the claimed limitations of a plurality of superimposed, contiguous, mutually adhered conductive polymer layers are either inherent in Sullivan's device that constitute a conductive polymer, or it would have been obvious, in view of Fudim, that the multiple steps of forming the conductive polymer results in a conductive polymer which is composed of plurality of superimposed, contiguous, mutually adhered indistinguishable conductive polymer layers.

Furthermore, the formation of a plurality of superimposed, contiguous, mutually adhered conductive polymer layers is a process limitation which would not carry patentable weight in this claim drawn to a structure, because distinct structure is not necessarily produced.

Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi et al.*, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the

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process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not.

Note that the applicant has the burden of proof in such cases, as the above case law makes clear.

Regarding claims 50, 51, 53, 112 and 113 prior art teaches a conductive trace of a printed wiring board configured to be carried by a single semiconductor device component and configured to at least partially electrically connect two semiconductor device components and substantially entirely carried by a semiconductor device component.

Regarding claims 54, 59, 116 and 120, Sullivan teaches in figure 2 a semiconductor device component comprises a layer of a carrier substrate 10.

Regarding claims 58 and 119, Sullivan teaches in figure 2 at least one conductive trace communicates with a contact of the semiconductor device component.

Regarding claims 62, 63, 123 and 124, Sullivan teaches in figure 2 semiconductor device component comprises leads 15 wherein the at least one conductive element contacts one of the leads.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 48, 55, 56, 60, 61, 111, 117, 118, 121 and 122 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sullivan (4,610,941) and Fudim (4,752,498), as applied to claims 47, 52, 110 and 114 above, and further in view of Lee (4,954,873).

Regarding claims 48, 56, 111 and 118, Sullivan and Fudim teach substantially the entire claimed structure, as applied to claims 47, 52, 110 and 114 above, except a polymer being a thermoplastic conductive elastomer.

Lee teaches using a thermoplastic conductive elastomer as a conductive polymer to interface between electronic devices and contact pads. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a polymer being a thermoplastic conductive elastomer in Sullivan and Fudim's device in order to provide more flexibility to the wirings of the device.

Regarding claims 55, 60, 61, 117, 121 and 122, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a dielectric layer disposed on an active surface of a semiconductor die in a packaged semiconductor device in prior art's device in order to operate the

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device in its intended use (by using a semiconductor die which must include an active surface) and in order to protect the device (by using a dielectric layer on the active surface and by packaging the device) by conventional means, of which official notice is taken.

Claims 67 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuki et al. in view of Lee.

Matsuki et al teach substantially the entire claimed structure, as applied to claims 64 and 75, except a polymer being a thermoplastic conductive elastomer.

Lee teaches using a thermoplastic conductive elastomer as a conductive polymer to interface between electronic devices and contact pads. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a polymer being a thermoplastic conductive elastomer in Matsuki et al.'s device in order to provide more flexibility to the wirings of the device.

Claims 75 and 84-85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Congleton et al. (5,007,576) in view of Matsuki et al.

Regarding claims 75 and 84-85, Congleton et al. teach in figure 1e and related text a semiconductor device assembly comprising a first semiconductor device component 10 including at least one contact pad 10a (see figure 1c); a second semiconductor device component 30 including at least one contact pad 30a; and at least one conductive element 16 (see figure 1c) connecting the at least one contact pad of the first semiconductor device component to the at least one

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contact pad of the second semiconductor device component, wherein at least one conductive element 16 is located on a surface of each of the first 10 and second 30 semiconductor device components, and wherein the at least one conductive element 16 extends across a peripheral edge of at least one of the first and second semiconductor device components (column 4, lines 5-9 and column 5, lines 7-27).

Congleton et al. do not teach at least one conductive element comprising a plurality of superimposed, contiguous, mutually adhered layers comprising conductive material.

Matsuki et al. teach in figure 2 and related text at least one conductive element 7 comprising a plurality of superimposed, contiguous, mutually adhered layers 13, 15, each of the layers comprising copper, a conductive material (column 8, lines 31-34).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use at least one conductive element comprising a plurality of superimposed, contiguous, mutually adhered layers comprising conductive material, as taught by Matsuki et al., in Congleton et al.'s device in order to improve the adhesion between the conductive element and the surfaces there under, while providing good conductor conductivity. The combination is motivated by the teachings of Matsuki et al. who point out the advantages of using a conductive element comprising a plurality of superimposed, contiguous, mutually adhered layers comprising conductive material (column 7, line 65 to column 8, line 44).

Response to Arguments

Applicant arguments with respect to claims 64-68, 75-79 and 81-85 were adequately addressed in previous office action.

Applicant's arguments with respect to claims 47-48, 50-56, 58-63 and 110-124 have been considered but are moot in view of the new ground(s) of rejection.

Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is (571) 272-1660. The Examiner is in the Office generally between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

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Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**



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O.N.
November 4, 2004



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